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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

RIFC-INT
FOUNTAIN RIVER
Flood Control Plan

A FLOOD CONTROL PLAN FOR THE PROTECTION OF MANITOU SPRINGS

Prepared as a supplement to the
Department of Agriculture's
Survey Report
on the
Fountain River
Colorado

July 6, 1950

Intermountain Forest and Range Experiment Station
Forest Service
U. S. Department of Agriculture
Ogden, Utah

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A FLOOD CONTROL PLAN FOR THE PROTECTION OF MANITOU, COLORADO

Introduction. The town of Manitou is located in a narrow canyon of Fountain Creek at the confluence of Williams Canyon and Ruxton Creek. The drainage area above the town is 91 square miles. The town has suffered flood damages of $728,800 for the 45-year period 1902-1947 in 5 floods. For the period 1880-1947 there have been 9 moderate to severe floods. Williams Canyon, containing 3 percent of the drainage area, has been the sole contributor to 3 floods and a major contributor to 2 floods.

After the flood of 1921 a flood protection plan by a private engineering firm was prepared for Manitou and while the cost precluded general installation some of the recommendations were put into effect. However, a critical flood hazard consisting of restricted channels still exists, as evidenced by the damage caused by the recent flood of May 1947.

Program summary. A field examination and subsequent analysis indicates that the most feasible plan of the several plans considered for the alleviation of flood damage in Manitou to provide protection from floods experienced or reasonably anticipated is a coordinated program utilizing improved land management practices, minor erosion control structures, water and sediment detention structures and channel rectification. The downstream engineering program as described herein should consist of 4 debris dams and channel rectification on 15,315 ft. of channel at a total

installation cost including maintenance during installation of $721,300. Average annual maintenance is estimated at $6,900 per annum.

General. The town of Manitou is located in the narrow canyon of Fountain Creek at and immediately below the junction of Ruxton Creek and Williams Canyon about 5 miles west of Colorado Springs. The total drainage area above Manitou is about 91 sq. mi. or 58,309 acres including 11,207 acres in Ruxton Creek and 1,888 acres in Williams Canyon.

Topography. The drainage basin above Manitou is characterized by precipitous slopes with elevations varying from 6,390 feet in town to a general ridge elevation of about 11,500 ft. and a maximun elevation of 14,100 at Pikes Peak.

Tributary areas. There are 9 major tributaries ranging from 1,245 acres to 11,207 acres in Fountain Creek drainage above Manitou. Table 1 lists these and other areas as shown on map 1 and indicates the portion of the area which lies above water storage or debris dams which exert some control on floods. Table 1 indicates that of the total area of 58,309 acres above Manitou control is exerted on 16,251 acres by 7 storage reservoirs with an aggregate capacity of about 7,958 acre feet. It is realized that the total storage indicated is not wholly available for storage of flood flows, however, the structures will assist materially in modifying flood flows. In addition to the above listed reservoirs there are 4 sediment detention structures constructed about 1935 and located in the main channel of

Table 1.

Area No.	Tributary name	Area acres	Control structures name	Controlled acres	Storage acre feet	Use[1]
A	Small gulches	3,405	-	-	-	-
B	Crystola Cr.	4,499	Ute Pass #5, #8	3,100	30	FC
	Area above Crystola	7,904				
C	College Gulch	1,146				
D	Catamount Cr.	9,011	S. Catamount Res.	3,886	2,604	WS
E	Crystal Cr.	2,880	Crystal Res.	2,265	3,479	WS
F	Small gulches	1,446	-	-	-	-
G	Cascade Cr.	5,171	-	-	-	-
J-1	Small gulches	6,112	-	-	-	-
	Area above Cascade	33,670				
H	Small gulches	198	-	-	-	-
I	French Cr.	6,797	Manitou Res.	2,600	2/400	WS
J-2	Small gulches	1,300	-	-	-	-
K	Waldo Canyon	1,245	-	-	-	-
L	Small gulches	1,786	-	-	-	-
M	Small gulches	218	-	-	-	-
O	Ruxton	11,207	Lake Moraine #4	4,400	1,445	WS
N	Williams	1,888	-	-	-	-
Totals		58,309		16,251	7,958	

1/ WS = water supply, FC = flood control
2/ Estimated

R.69W.

AREA ABOVE RESERVOIRS

PRIMARY FLOOD & SEDIMENT SOURCE

SECONDARY FLOOD & SEDIMENT SOURCE

AREA COVERED BY MAP 2

EXISTING FLOOD CONTROL DAM

PROPOSED FLOOD CONTROL DAM

WOODLAND PARK

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

COUNTY

COUNTY

FOREST

NATIONAL

TELLER

EL PASO

PIKE

Crystola

Green Mtn. Falls

Cascade

Manitou

Creek

Canyon

28

24

FOUNTAIN RIVER
ABOVE
MANITOU, COLORADO

SCALE 0.8"= 1 MILE

2 - 19 - 48

J.A.A.

Fountain Creek immediately above Manitou which serve to unload the debris from flood flows. These structures have a limited value at present as their detention ponds are filled with sediment.

Floods. Manitou has been subjected to at least nine damaging floods in the period 1880 to 1947. Seven of these are considered major floods. Table 2 lists the floods and tributary sources. Table 2 indicates that of the 9 damaging floods Williams Canyon has been sole contributor 3 times and a major contributor 2 other times.

The total damage from floods from 1902 to 1947 for a 45-year period is $728,800 or an average annual damage of $16,200, based on adjustment of damages to 1947 cost index.

Flood control activities. The town of Manitou which is located in a narrow canyon suffered flood damages from the time of early settlement but continued to encroach on the flood plains and channels of Fountain Creek, Ruxton Creek, and Williams Canyon until the damaging flood of 1921. After this flood a flood control plan was prepared for Manitou by a private engineering firm. The plan recommended removal of certain buildings causing constrictions in the channels and general channel rectification. Local interests however could not finance the total project, however portions of the plan were accomplished. The Forest Service in 1933-35 constructed sediment detention dams in the main channel of Fountain Creek above Manitou. The town expended about $70,000 up to 1937 on channel improvements, and additional improvement work of an unknown amount has been done by private concerns.

Table 2.

Date of flood Year	Month	Magnitude S	M	L [1]		M [2]	Remarks
1880 [3]	Summer	S			Williams	W	1 life lost
1882 [4]	July 2	S			Williams Ruxton Fountain	W	1 life lost - 8 ft. wall of water from Williams
1894	May 30	S			Williams Ruxton Fountain	R	Ruxton highest stage known since settlement
1895 [3]	-		M		Williams	W	
1897	-	S			Williams	W	
1902 [3]	August 5	S			Fountain	F	Storm center near Green Mountain Falls
1908 [3]	Summer		M		Fountain Ruxton	-	
1921 [3]	June 5	S			Fountain Ruxton Williams	R	
1935 [3]	May			L	Local town runoff	-	
1947	May	S			Williams Fountain Black	W	1 life lost

1/ S - Severe, M - Medium, L - Light
2/ M - Main damaging tributary, W - Williams, F - Fountain, R - Ruxton
3/ Data from H.D. 186, 78th Congress, 1st Session
4/ Chicago Times, July 3, 1882 (reprinted in Telegraph, Colorado Springs, July 28, 1938.)

The present nondamaging capacity of Fountain Creek through Manitou is about 1,000 second feet. The capacity of Ruxton Creek is about 800 second feet and the capacity of Williams Canyon channel is about 200 second feet.

Flood and sediment problems. Manitou has suffered serious flood water and sediment damages and loss of life in the past from flash floods resulting from high intensity rainfall sometimes augmented by high spring snow-melt runoff. These floods originate both from local tributaries such as Williams Canyon, Waldo Canyon, Black Canyon, Ruxton Creek, as well as general contribution from the 91 square mile area of Fountain Creek above Manitou. The tributary area causing the principal damage is Williams Creek containing 3 percent of the area. This tributary has a drainage area of steep slopes and much exposed bare rock or denuded areas which are conducive to rapid runoff, high peaks, and concentrated sediment loads. Other similar tributaries are Waldo and Black Canyon. Flood flows from these tributaries, with the exception of Waldo Canyon, debauch from steep canyons onto highly developed urban areas which have encroached on their flood channels. The combination of restricted channels in addition to the flatter main-stream gradient causes the flood waters to drop their sediment loads, clogging channels and causing severe damage at the mouths of each tributary, as well as clogging the main channel of Fountain Creek.

Analysis of data. A field examination and an office analysis were made of the watershed area above Manitou. Such factors as the physiographic features, topography, drainage network were considered in relation to their effect on the probable magnitude and synchronism of flood peaks. The area above Manitou is subject to more frequent intense storms, however the higher elevations of the upper watershed preclude storms and therefore floods of such magnitude as are experienced in the plains of eastern Colorado. The geologic, soil, vegetative cover condition, and trend were studied as well as past flood and sediment source areas. The general flood-sediment source areas are shown on map 1.

A study was made of the existing flood channels in the town of Manitou, their probable adequacy, and various methods of increasing their capacity taking into consideration existing urban developments.

Due to the steepness of topography in this vicinity there are no feasible water storage sites or locations to divert flood waters around the town.

Conclusions. An examination of all pertinent data disclosed the following principal factors relative to flood and sediment problems:

1. The principal damaging tributary is Williams Canyon which, due to watershed features, steep slopes, and the Cave of Winds road, discharges large quantities of debris onto Canyon Road where the existing channel is grossly inadequate.
2. Other important flood and sediment flows contributing to the problem originate from the small tributaries from the north side of Fountain Creek.

3. The major sediment source area of upper Fountain Creek is a strip 1 to 2 miles wide located on the east side of Fountain Creek from Cascade to Woodland Park.

4. The present flood channels through Manitou are of inadequate capacity. Study of past flood peaks in this area and adjacent areas indicates that channels should be increased to handle flows about 50 percent greater than present channel capacities.

Recommended Plan. The most feasible engineering plan of the several plans considered for the alleviation of flood damages in the town of Manitou is a coordinated program utilizing water and sediment detention structures and channel rectification. The quantities included in the following discussions are based on reconnaissance field examination, aerial photographs, and small-scale maps which lack sufficient detail and precision to allow the development of accurate and detailed plans. Preliminary sketches and designs were made for all improvements, however prior to construction it will be necessary to make detailed engineering field surveys and designs.

The program which will be discussed in greater detail in subsequent paragraphs will consist of:

1. Detention dams on Fountain Creek near Crystal Creek, Williams Canyon, Black Canyon, as well as cleaning out the larger existing debris dam near Manitou.

2. Channel rectification of Fountain Creek, Ruxton Creek, and Williams Canyon channel through Manitou.

The above program has been broken down into five sections of improvement. These sections are (1) Improvements on upper Fountain Creek, (2) Improvement plan Williams Canyon, (3) Improvement Ruxton Creek Channel through Manitou, (4) Improvement of Fountain Creek channel through Manitou, (5) Minor work. Preliminary channel locations are shown on map 2.

Section 1. (a) It is proposed to construct an earth fill dam of about 30 acre feet capacity (level) on Fountain Creek near Crystal Creek. This structure is intended to stabilize active head cuts on Fountain Creek as well as trap sediment from the area above it.

(b) The debris dam located immediately above the town of Manitou should be cleaned of all debris, and maintained clean after every flood. The cost of the work in this section is estimated at $50,000.

Section 2. Williams Canyon enters Manitou along Canyon Avenue. The improvements, residences, hotels, streets along Canyon Avenue have suffered considerable water and sediment damage from flash floods from Williams Canyon. Discharges from Williams Canyon (3 sq. mi. drainage area) as determined from a study of past floods have probably not exceeded 500-700 second feet, however, these floods are highly charged with debris ranging from sand to cobbles. Much of this debris has its source from the 0.6 mile of road to the Cave of the Winds, which is location in the narrow canyon bottom. The town of Manitou has constructed an enclosed storm sewer about 4 feet sequare and 1,000 feet in length on about a 6 percent slope

MANITOU, COLORADO

AT FOUNTAIN CR, RUXTON CR, WILLIAMS CAN.

0 100 200 300 400 500 600

Scale 1 inch = 200 ft.

STREAM CHANNEL
STREET
OPEN CHANNEL
CLOSED CHANNEL

Notes

Fountain Cr.	slope	18 ft per 1000
Ruxton Cr	slope	49 ft per 1000
Williams Can.	slope	60-78 ft per 1000
Contour elevations	about 20 ft low.	

RM 5+7

RM 5+0

WILLIAMS CANYON

RUXTON AVENUE

PARK AVENUE

CANON AVENUE

MANITOU AVENUE

CHURCH BROOK

RUXTON CREEK

FOUNTAIN CREEK

NW 1/4 | SW 1/4

SEC 6 | SEC 5
T 14 SOUTH
R 67 WEST

6450 6400 6500 6350 6300

located under the last sidewalk of Canyon Avenue and discharging into Fountain Creek under the arcade (station 25 + 75, Fountain Creek), map 2. At station 9 + 95 Williams Canyon, the intake to this storm sewer has a controlled opening of about 30 square feet with its top level to the grade of Canyon Avenue so that excess water will be discharged from Canyon Avenue. A sewer of half round openings in the east curbing of Canyon Avenue from station 4 + 50 to 8 + 10 is intended to convey this excess water into the storm sewer. What usually happens during a flash flood is that the intake at station 9 + 95 is clogged or partially clogged by the initial debris load resulting in most of the debris and flood water flowing down Canyon Avenue.

The channel of Williams Canyon from station 9 + 95 to 16 + 85 is in an open, unimproved section, with the exception of the closed section at station 13 + 00 which is a garage built over the channel. The channel is very restricted and is flanked by residences on either side. At station 16 + 85 the channel crosses Canyon Avenue, through a 2-foot square box, continues up the east side for 20 feet, then crosses through an 18-inch pipe to the west side where it is in a 2 X 4 foot open section for 100 feet to station 19 + 00, thence in a 4-foot square box for 75 feet. This point is very restricted with a 30-foot vertical canyon wall on the east side, the 30-foot bottom is occupied by Canyon Avenue and a 2-story residence on the west side. From station 19 + 95 to 2640 the channel located along the west side of the road is unimproved and has a capacity of about 90 second feet.

Further improvement of the channel of Williams Canyon to the size necessary to transport flood water and debris is precluded due to the highly developed area, disposal of debris in Fountain channel and excessive cost. It is obvious that in order to handle the flood flows the debris will have to be removed. While there are no feasible reservoir sites to impound all the flood water in the area due to steepness of topography, there are several debris inpounding sites. However, under existing conditions even if the debris is unloaded above the Cave of the Winds road the flood waters will quickly pick up another load as it goes down the road through this reach.

The most feasible plan consists of:

a. A debris dam located in the watershed controlling about 1,200 acres. The dam will serve to dampen the initial flood peak and unload debris.

b. Abandon the Cave of the Winds road up Williams Canyon and widen existing Serpentine road. This latter road was used as a 2-way road after the May 1947 flood.

c. A masonry or concrete debris dam about 30 feet in height located at station 33 + 00 of Canyon Avenue.

d. Improve channel Williams Canyon station 9 + 95 to 33 + 00. This will consist of a channel of about 600 second feet capacity.

The estimated cost of the above items is:

(a) Debris dam	30 acre feet	$40,000
(b) Road change	1 mile	20,000
(c) Debris dam	20 acre feet	30,000
(d) Channel improvement	2,690 feet	20,000
Total		110,000

Section 3. This section includes channel rectification of Ruxton Creek through Manitou. Ruxton Creek has a drainage area of about 11,207 acres above Manitou. The major portion of the watershed lies within the Pike National Forest and City of Colorado Springs watershed lands. Due to watershed protection for many years, resulting in improved vegetative cover conditions, sediment contribution is now small and design flood flows should not exceed 800-1,000 second feet.

The present capacity of the 2,130 feet of Ruxton Creek channel averaging 10 feet wide and 6 feet deep, through Manitou is about 800 second feet on a slope of about 5 percent. There are several restrictions which need to be removed to bring the channel to proper operating capacity. The work in this section is estimated at $15,000.

Section 4. This section includes channel rectification of the channel of Fountain Creek through Manitou. The total length of channel to be improved is 12,630 feet, however, the section of main improvement consists of 4,660 feet between river mile 5.0 and 5.7. The slope of Fountain Creek through this section is about 1.8 percent or 95 feet per mile. Beginning at about river mile 5.7 about 400

feet above the Ute mineral works at a point designated station 0 - 00 the reach has been divided into the following parts:

(a) 0 + 00 to 21 + 65 (mouth Ruxton Creek)

(b) 21 + 65 to 46 + 60 (west end Duclo Park)

(c) 46 + 60 to 126 + 30 (city limits)

Part a. In this part the channel 2,165 feet long is rectangular in shape with section varying from 15 to 20 feet wide, 4 to 6 feet deep. The bottom is generally unimproved, the sides are masonry, concrete, or unimproved. Bankful capacity is 800 - 1,000 second feet. The channel is located in an urban area, mainly residences. The proposed improvement program is designed to increase the present capacity to 1,500 second feet with 1 foot of freeboard. Improvements will consist of an entrance section at station 0 + 00, increasing wall height 2 feet in some cases or deepening channel 2 feet in other cases, constructing improved sections where required, realignment of several bends and constructing grade weirs in the channel bottom. Estimated cost of these improvements for 2,165 feet at $50.00 a ft. is $109,000.

Part b. This part from 21 + 65 to 36 + 25 or 1,360 feet is located in the area of highest values in Manitou. The channel is generally enclosed on both sides by business enterprises. In addition to the flow of main channel, Ruxton Creek and Williams Canyon enter Fountain Creek in this section. While exact synchronism of flood peak is not to be expected, still the channel in this section should

have a larger capacity than that of part a. The capacity of the present channel in this section is generally about 1,400 second feet, although several restrictions cut this to 1,000 second feet. The average channel size is 20 to 22 feet wide and 5 to 6 feet deep. Several bridges however, have openings 15 feet wide and 6 feet deep.

The proposed improvement program is designed for a channel capacity of 2,000 second feet with 1-foot freeboard. The program will consist of removal of obstructions such as pipes, bridges, increasing the channel cross-section by raising existing walls, constructing new walls, or deepening channel. Present alignment will be modified to secure better hydraulic characteristics. Estimated cost of improvements in this section is:

1,360*	feet at $75.00	$110,000
5	bridges at 2500	12,500
16	weirs at 2500	40,000
Alignment		10,000
		$172,500

* Assumes 1.2 cu. yds. excavation per lin. ft. at $ 4.00
1.2 cu. yds. concrete per lin. ft. at $60.00

Part c. This part extends from station 46 + 60 to station 126 + 30. The 7,970 feet of channel passes through an area of lesser development than part b, the channel is generally unimproved, however, except for several points channel capacity is about 2,000 second feet. Alignment and right-of-way problems will be more easily solved due to lesser development. The proposed program will consist of channel enlargement, bank protection, construction of lined channel

through critical areas, and removal of obstructions. The estimated cost for 7,970 feet is $79,700.

The total cost of this section (a, b, c) is estimated at $361,200.

Section 5. Under this section is included improvement works to tributaries areas discharging into Manitou located downstream from the confluence of Fountain Creek, Williams Canyon, and Ruxton Creek. The aggregate drainage area of these tributaries is about 6,100 acres. Principal tributaries are Sutherland Creek and Black Creek. Black Creek has caused some flood and sediment damage due to high runoff characteristics and restricted outlet channel to Fountain Creek.

The improvement program should include a debris dam on Black Creek and enlargement and improvement of the downstream channels of Black Creek, Sutherland Creek, and other minor drainages. The total cost is estimated at $45,000.

Program costs. The following table summarizes the program costs:

Section 1.	1-debris dam on Fountain Cr.	$40,000	
	Clean out existing debris dam	10,000	
			$50,000
Section 2.	2-debris dams Williams Canyon	70,000	
	Channel improvement	20,000	
	Road change - 1 mile	20,000	
			110,000

Section 3.	Channel rectification Ruxton Cr.	$15,000	
			$ 15,000
Section 4.	Channel rectification Fountain Cr.		
	(a) Upper 2,165 ft.	109,000	
	(b) Middle portion 1,360 ft.	172,500	
	(c) Lower portion 7,970 ft.	79,700	
			361,200
Section 5.	1-debris dam Black Cr.	30,000	
	Tributary channel improvement	15,000	
			45,000
	Base installation cost		690,200
	Maintenance during installation period		31,100
	Total installation cost		721,300

The average annual cost of installation including maintenance during the installation period is $18,900 with annual maintenance costs following installation of $6,900.

SOIL CONSERVATION SERVICE
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FP
SURVEY REPORTS
(Revision)
Fountain River Watershed

September 1, 1953

WDL

Cyril Luker, Regional Director
Soil Conservation Service
Albuquerque, New Mexico

Dear Mr. Luker:

Under separate cover, I am forwarding 15 copies of the survey report for the Fountain River Watershed which has been revised in accord with current Departmental policy and procedures. There is also transmitted a like number of appendices in which have been inserted an addendum and table identifying the changes made in the revised report as compared with the information contained in the appendices.

The forwarded material provides 12 copies of the report and appendix for your transmittal to Washington, as called for in Mr. Signell's letter of June 29, addressed to Regional Offices of the Soil Conservation Service. Three additional copies of both the report and appendix are included for use in your office. It is our understanding that your office will prepare appropriate letters of transmittal and for that purpose there is attached a statement indicating the variations that exist between the procedures used in the revised report and the standards established by circular A-47 of the Bureau of the Budget.

see Sup. Prog. Water Resources Policy

Prior to reproduction of the report a draft was reviewed by your office and it is, therefore, concluded that the report and appendix material is now ready for transmittal to Washington.

Comm Replaced

Very sincerely yours,

DONALD E. CLARK
Regional Forester

Enclosure

By: A. L. NELSON Acting

xc-with reports
cc-R-4(for Mr. Lobenstein)
cc-Rocky Mtn. Station
cc-Pike
cc-Chief

STATEMENT REGARDING EXTENT AND DEGREE TO WHICH THE REVISED (MAY, 1953) FOUNTAIN RIVER SURVEY REPORT DOES NOT AGREE WITH THE PROVISIONS OF BUREAU OF THE BUDGET CIRCULAR NO. A-47

In several respects the standards and procedures followed in revising this report are not in agreement with the standards and procedures set forth in Budget Circular A-47 as interpreted by the Assistant Secretary of Agriculture in his draft copy of Revision of Policies and Procedures to Guide the Preparation of Flood Prevention Survey Reports dated March 3, 1953. Variations in standards and procedures used in preparation of the report as compared to the Assistant Secretary's Policy and Procedure Guide are discussed in the following paragraphs. Parenthetical references are to Circular A-47.

Costs

(a) Replacement costs (5h).--Necessary replacements required to maintain the effectiveness of the program were considered of a minor nature and were included in operation and maintenance costs. No change in policy.

(b) Losses in tax revenues (9c).--Net losses in tax revenues were not considered in preparing the report. However, it is believed that increases in tax revenues stemming from increased production of crops and livestock will accrue. Acquisition of privately-owned lands by Federal or other public interests is not recommended in the Fountain River report.

(c) Losses to recreation, fish and wildlife, and scenic, archeological or historical values (9f).--It is expected that installation of the recommended programs will result in net gains to recreation, fish and wildlife. Scenic, archeological, or historical values will not be adversely affected by the program--clarification of policy.

(d) Allocation of costs (11).--Report contains no recommendations involving reimbursement of the Federal Government for funds expended. Costs of A and B measures are shown separately. It is assumed that the primary purpose of A measures is "flood control" and the primary purpose of B measures is "watershed management." Clarification of policy.

(e) Sharing of costs (13).--The report distributes installation costs of program measures to be installed on non-Federal land to the Federal Government, local interests, and individuals. The recommended shares to be borne by the participating interests were determined on the basis of applicable Federal laws, benefit incidence, precedent, and USDA policy. Policy clarification.

Contribution of local interests will include labor, equipment, rights-of-way, etc.

(f) Share of costs to be borne by beneficiaries from changed use of property (17c).--The report does not claim land enhancement benefits as such. The only change in land use evaluated is the recommended retirement of dry farm land to grass. It is not expected that this change in land use will result in an immediate enhancement of value. New Policy.

Benefits

(a) Net income (8b, c, and d).--Conservation benefits shown in the report are gross benefits. Associated costs, primarily costs of harvesting the increased production, are considered as program costs and are included in operation and maintenance costs of B measures. A-47 requires that the associated costs be subtracted from the gross value to obtain net benefits. Associated costs would not be included as program costs.

(b) Primary and secondary benefits (5d and e, and 8).--Benefits in the report have not been designated as primary or secondary. However, if such a classification were made only a small percentage of the total benefits would be classified as secondary. A-47 requires that primary and secondary benefits be shown separately. New policy.

Evaluation

(a) Benefit-cost comparisons (7a(2)).--The report compares total program benefits to total program costs. A-47 calls for a benefit-cost comparison for each separable purpose. The reports show cost by separable purpose-flood control (A measures) and watershed management (B measures). Benefits are dependent upon the installation of both types of measures and it would be exceedingly difficult to divide the benefits between the two groups of measures.

A-47 requires that a range in benefit-cost comparisons be shown to indicate the reliability of the estimates. This was not done in this report.

(b) Interest rates (15).--In computing costs and benefits, an interest rate of 2.5% for Federal and other public and a 4% for private costs and benefits was used. Clarification of policy.

(c) Evaluation period (14).--The time period to be used shall be the useful economic life of the project or program, but in no case longer than 50 years. Time period used in computing costs and benefits in this report was perpetuity.

(1) The evaluation period shall begin at the completion of the installation period. Report agrees.

(2) The annual charge should be sufficient to recover or to restore the net initial investment with interest during the economic life of a project (not in excess of 50 years). Report computed on basis of perpetuity.

(3) Level of operations. For programs with an economic life in excess of 50 years, the values remaining at the end of 50 years should be determined in terms of uses expected with the project discontinued. Such values are of two principal types: (1) cost deductions in the form of the salvage values of unexhausted project investments, and (2) benefits from the enhancement in resources built up during the period of project operations. Perpetuity used in report.

Reports

(a) Contents of report (7a-1).--Based on available information, the report should clearly, but briefly, indicate:

(1) The need and the contribution to balanced national conservation and development.

(2) Relation of program to existing, authorized, and proposed development of the region.

(3) The efficiency of the program in meeting regional and national needs.

(4) Alternative means available in the region for meeting the same needs. Report is fairly adequate with respect to 1, 2, and 3. It contains very little discussion of 4.

(b) Variations from Circular A-47 (4a and c).--Reports shall be accompanied by separate statements whenever a report varies from the standards or procedures of Circular A-47: Reasons for such variations should be given (1) existing laws--cite laws (2) Department policy.

There are five major variations between the standards and procedures used in report preparation and Circular A-47 as interpreted in the draft copy of Revision of Policies and Procedures to Guide the Preparation of Flood Prevention Survey Reports, dated 3/13/53. They are:

1. Losses in tax revenue were not considered in preparing this report.

2. Gross conservation benefits are claimed instead of net.

3. Benefits are not classified as primary and secondary.

4. Benefits and costs are not shown separately for flood prevention (A measures) and watershed management (B measures).

5. Benefits and costs are computed on the basis of perpetuity instead of the economic life of the measures (not to exceed 50 years).